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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,879	09/05/2006	Christofer Hierold	2004P00018	4508
24131 7590 08/30/2007 LERNER GREENBERG STEMER LLP P O BOX 2480 HOLLYWOOD, FL 33022-2480			EXAMINER PATEL, PUNAM	
			ART UNIT 2855	PAPER NUMBER
			MAIL DATE 08/30/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

* 2

Office Action Summary	Application No. 10/591,879	Applicant(s) HIEROLD ET AL.	
	Examiner Punam Patel	Art Unit 2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-21 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 12-15 and 17 is/are rejected.
- 7) ☒ Claim(s) 16 and 18-21 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>09/05/06, 12/04/06</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the actuator of Claim 1, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Figure 4a should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

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be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 12 and 14 are objected to because of the following informalities: Claim 14 recites the limitation "the changeable electric property" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. Independent Claim 12 teaches a plurality of changeable "electric properties" in line 3. For the purposes of examination the "electric properties" of Claim 12 will be read as "an electric property". See Specification ¶ 13 and 23-25.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 17 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Disclosure fails to teach the apparatus comprising two separate structural elements that act to transmit a force to the nanostructure; an actuator **and** a movable mass with a tip (7) are not taught.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 12-15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Tombler et al. (Tombler et al. “Reversible electromechanical characteristics of carbon nanotubes under local-probe manipulation”, *Nature*, June 15, 2000).

With respect to Claims 12-14 and 17, Tombler et al. teach an apparatus comprising:
a support of two arms (Fig. 1, the pair of metal electrodes);
a single-walled carbon nanotube (SWNT) carried by the two arms (Fig. 1); and
wherein the conductance of the SWNT is changeable by mechanical deformation due to a force applied by a cantilever tip that is disposed between the two arms (Fig. 1c & Fig. 3 description, wherein a change in electrical conductance due to an applied force is taught to be an inherent property of the SWNT and the cantilever is understood to be the actuator/movable mass with a tip).

With respect to Claim 15, the support forms a U-shape (Fig 1c, wherein the two arms and the base substrate form a U-shape over which the nanotube is suspended).

Allowable Subject Matter

Claims 16 and 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With respect to Claim 16, the prior art made available fails to teach or fairly suggest the force sensor apparatus comprising a cusp on each of the two arms for suspending the nanostructure. The following definition has been relied upon for “cusp”: a point or pointed end. (“cusp.” *The American Heritage® Dictionary of the English Language, Fourth Edition*. Houghton Mifflin Company, 2004.)

With respect to Claim 18, the prior art made available fails to teach or fairly suggest the force sensor comprising two nanostructures carried by the arms. Claims 19-21 depend on claim 18.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chung et al. (J. Chung, J. Lee. “Nanoscale gap fabrication and integration of carbon nanotubes by micromachining.” *Sensors and Actuators A*. 104 (2003) pp. 229-235.) teach selecting a gap shape (I.e. sharp/cusped or round) that supports CNTs based on the device application and type of carbon nanotube (CNT) utilized.

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Husain et al. (A. Husain, J. Hone, Henk W. Ch. Postma, X. M. Huang, T. Drake, M. Barbic, A. Scherer, and M.L. Roukes. "Nanowire-based very-high-frequency electromechanical resonator." Applied Physics Letters. V. 83, No. 6 (2003) pp. 1240-1242.) teach a similar apparatus, wherein the drive (actuator) is magnetomotive.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Punam Patel whose telephone number is (571) 272-6794. The examiner can normally be reached on Monday to Friday 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PP
08/27/2007


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